

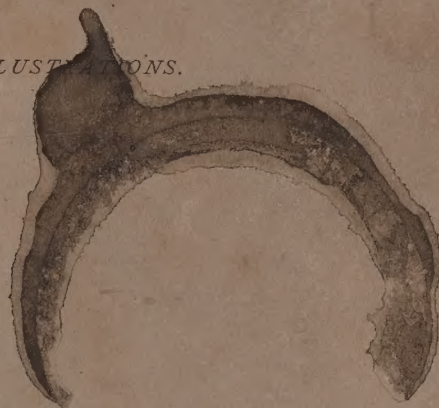
THE

HELIOTYPE PROCESS

BY

ERNEST EDWARDS.

WITH TWENTY-EIGHT ILLUSTRATIONS.



BOSTON:
JAMES R. OSGOOD AND COMPANY,
LATE TICKNOR & FIELDS, AND FIELDS, OSGOOD, & CO.
1878.



222 (faint)
743
Very Scarce
H.F.H.

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Copyright, 1876.
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PHOTOGRAPHY IN THE PRINTING-PRESS.

BEING A DESCRIPTION OF THE WORKING OF THE HELIOTYPE PROCESS.

IN a paper recently read on Photography in the Printing-press I entered somewhat fully into the history of photographic processes. I propose herein to confine myself almost entirely to a description of the *Heliotype* process and its applications. A few technical words of introduction, however, would seem to be necessary. Photographic processes may be divided into two classes, — those which depend on the fact that certain salts of silver *darken* under the action of light, and those which depend on the fact that under certain conditions gelatine or analogous bodies are *rendered insoluble* under the action of light. In the first group occurs the ordinary photograph, which, though it has many points in its favor, has one fatal drawback, — the want of stability in its results. From the earliest days in the history of the photographic art, an army of experimentalists have sought to find a remedy in the substitution of a process based on the second principle I have named, — that is, that light under certain conditions renders gelatine insoluble, so that when a negative is interposed between a sensitive sheet of gelatine and the light, and in this way certain portions shielded from the light, those portions may remain unaffected and in their normal condition of solubility. Their efforts have resulted in the establishment of a number of processes which may be again divided into three classes.

1st. Those in which each print is itself a sheet of gelatine acted on by light, such as Carbons or Autotypes. Braun of Dornach is well known for such productions, and in his method each picture is itself formed of a sheet of gelatine which has been acted on by light.

2d. Those in which *one* gelatine print is obtained by means of light, and is used as a means of supplying a metal or stone printing matrix, such as Photo-Lithography, or the Woodbury process.

3d. Those in which one gelatine print is obtained by means of light and itself, that is, the actual sheet of gelatine itself, is used as a printing matrix, such as in the Heliotype process.

It is with this latter application we have now to deal.

The action of hot water on gelatine is to dissolve it; the action of cold water is not to dissolve it, but to fill up the pores and expand it as in the case of a sponge. But if a portion of a bichromate, say of potash or ammonia, be added to the gelatine, and in this condition it be exposed to light, the char-

acter of the gelatine is altered, — hot water will no longer dissolve it, cold water will no longer expand it, — can no longer penetrate the pores.

The light has, in fact, had the effect of closing the pores, and thus rendering the gelatine waterproof. If, then, we cover a plate with bichromated gelatine, and expose it to light under a negative, there will be certain parts of it which will be *completely* waterproofed, having the pores *completely* closed by the light; certain parts — the half-tones — which will be partly waterproofed, having the pores partly closed; and certain parts where the condition of the gelatine will be unchanged. Now, if we steep this plate in cold water, some portions of it — those where light has not acted — will absorb water, and others will refuse to do so, having been waterproofed by light. If we take grease, and rub it over the plate, the result will be that where the pores are full of water — that is, where the light has not acted — the grease will not touch the gelatine; but where the light has acted, the pores are closed, there is no water, and grease attaches itself readily; where the light has partly closed the pores, the small quantity of water absorbed does not prevent a small quantity of grease attaching itself. Lithographic ink is simply grease to which coloring matter has been added; and a lithographic roller charged with such ink, and rolled over such a plate, speedily reveals the light-produced image.

We have in this manner constructed the analogue of the lithographic stone, and not only this, but far more. A lithographic stone will not do more than discriminate between black and white, it will not recognize half-tone. In our gelatine substitute all the half-tone of the negative is retained, and we have made our drawing on it by the sun instead of by hand.

This method was discovered by Poitevin, and even patented by him, as early as 1855. But I doubt if he understood its true principle; for he appears to have considered that the action of light converted the gelatine into something of a waxy or resinous nature, which, on that account, took the greasy ink. However this may be, no results were produced by him, and the method in that form did not come into use. The practical difficulties met with in attempting to work it arose first from the spongy and delicate nature of the gelatine film in those portions where light had not acted; and, next, from the difficulty of obtaining intensity in the inking, and sharpness in the image, and from other technical obstacles. Bearing in mind the character of the image on the gelatine, it will be understood that those parts of the gelatine not acted on by light are in much higher relief, from the presence of the water which they absorb, than those parts which, having been acted on by light, do not absorb water. But it is the depressions which take the ink, and the walls on each side of the depressions prevent the roller from reaching them; and, again, it is the depressions to which the pressure must be applied, in order to allow the paper to pick up the ink. It was found that when the requisite pressure was applied, the gelatine was speedily destroyed, more especially as the description of pressure employed was that used in lithography, where the force is a scraping one over the surface of the stone.

MM. Tessieu du Motay and Marechal were the first to make use of Poitevin's method in any way commercially. They attempted to provide against the swelling of the unaltered gelatine, by using a very thin layer

of it, and only printing such subjects as gave but slight contrasts. The results produced, though sadly wanting in vigor and firmness, were at the time (1868) considered satisfactory; but it was found that after a very few impressions the gelatine was crushed, and became useless, more especially as the film, to be at all manageable in inking, had been made very thin.

Herr Albert, of Munich, next produced some results by a similar method. Beyond what is contained in his patent, we do not find that his plan of working has been published; but it is believed to be somewhat as follows: Instead of a lithographic stone, a glass plate is employed of considerable thickness. On this is placed a layer of gelatine and bichromate, which, when dry, is hardened through the glass by exposure to light. On the top of this is placed a second thin coating of gelatine and bichromate; and this is exposed to light under a negative. In this manner a compound printing film is obtained, having the necessary degree of thickness to stand a certain amount of wear and tear, whilst, from its construction, the difficulty of the swelling of the gelatine is to a great extent got over; the plate is inked and printed in the usual way. Some of the results produced by Herr Albert are beautifully soft and delicate, but the whole are wanting in strength and robustness, and the process seems unsuited for the production of lines or subjects where firmness and strength are required. The films, moreover, are only mechanically united, and are liable to injury in working; whilst the use of glass plates as supports, from their liability to fracture, introduces an element of uncertainty into the process that is very undesirable.

In the Heliotype process I have applied Poitevin's principle in an altogether different method, which has not one point in common with those just referred to. There are many ways of closing up the pores, or of waterproofing gelatine. We have seen that the action of light in presence of a bichromate will do so completely. Admixture with alum, more especially chrome alum, will do so as completely without the action of light; and after such treatment the gelatine is converted into a tough, tawny, insoluble substance, like leather or parchment, capable of standing an apparently unlimited amount of rough usage. In the course of my experiments I discovered that gelatine might be converted into this substance, but that it still retained its property of being acted on by light in presence of a bichromate, and of receiving and refusing greasy ink. The merest trace of water is sufficient to secure the repulsion of grease; and in chrome alum we have the means of closing up the pores of gelatine to any desired extent, and our means of doing so under the most complete control. Here, then, was a most important point gained: instead of having to deal with a soft, spongy mass of gelatine, so swollen with water as to be useless, there was secured by this device a tough film of sufficient thickness, which, while it would absorb sufficient water to repel grease, was yet so little swollen as to present no difficulty in inking or printing,—a film which was sufficiently dense to give perfect firmness of line with entire freedom from the grain which is sometimes seen, and which was so tough that 1,000 or 1,500 impressions might be pulled from it without the least loss of quality.

But I found in practice, that, when these films were used on glass supports, there was great difficulty in getting contact between the gelatine-coated glass-plate and the negative, during exposure to light. The slightest inequality in the surface of either negative or gelatined glass, the slightest speck even, prevents contact; so that line subjects were practically unobtainable, and many plates were failures on this account. Moreover, but a comparatively small amount of pressure could with safety be applied to a glass plate in the press, — not nearly so much, indeed, as was desirable; and, even with the greatest pains, fractures were of frequent occurrence. To obviate these difficulties, I devised the following method: The solution of gelatine and bichromate, to which has been added the requisite amount of alum, is poured on the surface of a carefully levelled plate of any suitable substance, such as slate, and dried. But the surface of the plate has been first rubbed over with a little wax, so that when the film is dry it is readily detached. Instead of a thick glass plate, we then have a film only to deal with, of the thickness of stout paper, and just as manageable. With this film there is no difficulty in getting contact with the negative, and we are able to obtain the most intense sharpness. There is no risk of breaking the negative, and the management of the film is as easy as that of the paper on which photographs are ordinarily printed. A piece of such a film is placed in contact with a negative, and exposed to light, the sufficiency of the exposure being indicated when the whole details of the picture are apparent by such an examination as is made in the case of silver prints. The next step is to attach it to the support on which it is to remain during printing in the press. For this purpose a plate of metal is taken, such as zinc or pewter, and the exposed gelatine film is placed in contact with it under water. We have now to get rid of the water which is between the film and the plate. This is done by means of a tongue of india-rubber let into a strip of wood, — just such an instrument, in fact, as is used in cleaning pavements in dirty weather, and which is known by the name of the "squeegee." This instrument is passed sharply over the surface of the film, and squeezes out the water between it and the metal. Then the absorbing property of the gelatine is brought into play, and the film is attached to the plate by exactly the same force that a boy with a leather sucker is able to lift a stone of considerable weight, that is to say, by virtue of atmospheric pressure. The plate, with its printing film attached, is steeped in water for a sufficient time to soak out the superfluous bichromate, so as to prevent the further action of light, and is then ready for printing at the press. Instead of a glass plate, of necessity fragile, we have now a printing film to which we may apply, without risk, any pressure we please, and which, when the requisite number of impressions have been taken from it, may be removed from its metal support, and stowed away for future use. Having obtained our gelatine matrix on its metal support, we now come to the inking and printing. In previous processes of this kind, either a lithographic scraping pressure or a copper-plate rolling pressure has been employed. I have discarded both, and use in preference a simple vertical pressure, such as is obtained in an ordinary Washington printing-press.

Bearing in mind that the action of the process depends on the mutual repulsion of grease and water, it will be understood that the plate, like a

lithographic stone, must be dampened after each impression. This is done by means of a sponge and water, and the superfluous water is got rid of by the useful "squeegee." The plate has now to be inked; and in this operation I have been fortunate enough to introduce an improvement which gives a value to the heliotype process, possessed, I believe, by no other printing method in existence. If, in inking one of these plates, we use what is called a very stiff ink, we shall find that it will only adhere to the deepest shadows; if we thin down the ink we shall succeed in printing the delicate half-tones, but we shall no longer get depth in the shadows. This has been the notable fault with the productions of analogous processes; either shadows of intensity were produced with no half-tones, or half-tones without intensity. My method is to use two or more inks in succession, of different intensities, one after the other,—to begin the picture with a stiff ink and to continue it with a thinner. To produce different effects, the color of these may be varied. For instance, a stiff black may be used, which will give us the deeper shadows, and on the top of this may be rolled a thinner purple or brown, which will give us the half-tones. This ability to produce a bichromatic effect in a single printing places a great power in the hands of the heliotype printer. In order to produce prints with a margin, so as not to require subsequent mounting, a mask of thin paper is made, having an opening in it exactly the size and shape of the finished picture. The plate having been duly inked, this mask is placed on it, and over the mask the paper on which the print is to be produced. The press having been pulled, the picture is peeled away from the plate with a perfectly clean margin, being, in fact, mounted. The dispensing with the cost and necessity for mounting gives this method of printing a great advantage, especially in the case of book illustrations; indeed, I may say in almost all cases. With the mounted print, as it comes from the press, comes also the end of the process. The prints have only to be looked over, and any slight casual defects remedied, when they are ready for issue.

In some of the impressions may be noticed the effect of a tint apart from the color of the ink. This is obtained by a very simple device. We do not use our paper damp, but in the process of printing, it absorbs a certain amount of the water from the damp gelatine plate. If in place of plain water we use colored water, our paper also will absorb a portion of the colored in place of the plain water,—by this means and by the use of suitably colored water we obtain the effect of an India tint. Our inking rollers are also a peculiarity of the process, and have had to be contrived for this special use. They are composed of gelatine, glycerine, and a large proportion of castor oil, and give a surface best adapted to the method of printing.

There are two questions regarding the process that I am continually asked,—How many impressions can be produced from one plate, and how many impressions can be printed in a day? In reply to the first, we have printed as many as 1,500 to 2,000 impressions from one plate without any loss of quality, and the plate was only then stopped because no more were required. From accidents to the films, however, we are by no means free. We have to bear in mind that though our films will stand any usage

of the right kind, they will not bear the kind of usage that lithographic stones or copperplates are accustomed to receive; and we have, moreover, to bear in mind that in a new process everything, from first to last, has to be provided for in a new way, — new materials, new hands, new appliances. At present, therefore, we cannot look for freedom from such accidents as novelty necessitates; but when I mention that a fresh plate may be prepared in an hour, at a trifling cost, you will see that these are of comparatively small moment. In numbers, one man will print from one to five hundred impressions in a day. Compared with lithography, it will probably not be so cheap for large numbers; but for small numbers it will be cheaper, as the cost of drawing will be saved, and in either case the result will be more accurate. It is, of course, infinitely cheaper than any photographic or carbon process, or any other photo-mechanical process. Touching its applications, I need only point to the results which we have already obtained, to indicate many of them. But there are others equally valuable which we have not yet had opportunity of working. Amongst these latter, I may point to the use of heliotypes for pottery and enamelling purposes. It is only necessary to use an ink mixed with suitable oxides, and print on a suitable paper, to have on all descriptions of pottery, and at a lower price, pictures of art value in place of the anything but art pictures we are accustomed to accept. Again, this process provides a ready means of making prints in suitable ink for transfer to stone or zinc, or to wood for the purposes of the wood-engraver, and by simple modifications relief plates of suitable subjects may be made for printing with type. In this way the official gazette of the Patent Office is weekly produced in this city.

I have explained that there are many ways of waterproofing gelatine besides the action of light in presence of a bichromate. As I have shown, treatment with alum produces this effect. Other substances, such as tannin and some salts of iron, similarly render it insoluble and non-absorbent of water. Gallate of iron will especially render gelatine insoluble, and is the base of most writing-inks. If then we take a letter, or sketch, or circular, written with such an ink and apply it to a sheet of dampened gelatine, we are able to produce on the gelatine *without* the action of light, an image non-absorbent of water and, therefore, capable of being inked up. By this device we are able to obtain such results as are to be seen in the specimen page marked Direct Transfer. It will be understood that, having once obtained the gelatine matrix, transfers to stone or electrotype blocks are readily obtained. By this method we are daily producing considerable numbers of facsimile circulars, the card catalogue of the Public Library, blocks for book illustrations, maps, sketches, such as were contained in the Artists' Centennial Catalogue, and cuts such as appear from week to week in the "Courier" and "Times."

Having for its base a colored, or partly colored, design, a new kind of photo-chromo-lithography is within reach. Again by the use of different gelatine plates for different colors a chromo-heliotype may be produced. But the direction in which I conceive the process has the greatest value is in artistic and scientific education, where it affords a means of bringing within the reach of all reproductions of works of art and records of science which would be otherwise unattainable.

The publication of the Gray Collection of Engravings is an instance of the value of the process in this respect. I do not propose to assert that the Helio-types of this collection equal the originals; nevertheless they possess *some* of their merits, and at least serve as admirable educational studies.

It is true that the reproductions of drawings by such men as Raffaele and Michael Angelo contain the inevitable faults of the photograph produced by their discoloration from age: nevertheless, it is impossible to look at some of these without feeling that you have there the veritable work of the master; that his hand alone has produced the copy as well as the original. In point of price, there is no reason why pictures such as these should not take the place of those which at present are used to decorate even the walls of cottages.

It is true, as in all processes depending on a photographic negative for their base, that color is unfaithfully reproduced. Hence, oil-paintings depending on color for their effect require an intermediate translation. A copy must first be produced wherein the defects so arising must be corrected; and this copy must then be again reproduced for issue. It seems to me probable, that as progress is made there will be a distinct class of artists, who will be "translators of color into light and shade," for use in this and analogous processes. Where paintings depend for their effect on light and shade, or form, and not on color, this intermediate translation is not necessary.

It is to be remembered that the Helio-type is not an *originating* process. There must be in the first place an *original*, *suitable* for *reproducing*. Unlike painting or sculpture, it cannot *originate*, it cannot *idealise*,—it can only *realise*. There must be *originals*, and they must be *suitable*. Defects in the originals cause defects in the reproductions.

It may not be amiss to indicate the kind of drawings or originals that are *best* suited for reproducing. They should be considerably larger than the reproduction to be obtained, say twice the length and twice the breadth, and they should be made on fairly smooth drawing-paper. They may be in *wash* or *line*, *either* or *both*. But the most desirable point is that they should be in *monochrome*. I myself think that nothing equals india-ink for the purpose. Monochrome is to be understood literally. We frequently have drawings brought to us in so-called monochrome, where blues and yellows have been freely used to heighten the effect, — an error which is fatal as regards results. Occasionally a tinted ground may be used, and the lights added with Chinese white.

I do not mean to say that no satisfactory results can be obtained from other drawings and paintings in colors, but the *best* results are obtained from the originals made as I have indicated, the *worst* from those so-called monochromes in which blues and yellows, however slight, have been used for effect.

It may be interesting to note the rapid development of the process in this city where it has found its home. Established in one room in Tremont Street towards the end of 1872, — notwithstanding the interruptions to business caused by the great fire and subsequently by the panic, — it already occupies premises covering over twenty thousand square feet of floor. In place of the one press with which operations were commenced, nearly fifty are now at work, and a steam-press is in course of construction, — a growth

which has been, indeed, in some respects too rapid, for so much work involves of necessity the instruction of a large number of men in an entirely *new trade*, and the organization of machinery to meet the requirements of an entirely *new business*. By slow degrees the number of employes has reached above a hundred, and every week adds to the number. By slow degrees, also, but still steadily, the process of improvement is going on,—the improvements that only can come of time and the experience gained by those employed in printing.

For the reproduction of old or rare prints or engravings this process is especially valuable, or for the reduction and enlargement of existing ones. Where there is a steel or copperplate in good preservation, there is obviously no point in the use of any repeating process; for there is the certainty that there can be no *gain* of work by the operation of photography. But where a reduction is desired, or the plate is destroyed, such a repeating process as this comes in with overwhelming force. I would deprecate the idea that this or any similar new process is to *supplant* existing ones; it is to *supplement* them and to cover a field where existing methods cannot, on account of time, or expense, or accuracy, be made available.

For book illustration the heliotype process is especially valuable. The rate of production is rapid and certain, the cost is moderate, and the necessity for mounting is done away with.

For scientific record it is equally valuable. It retains the literal faithfulness of the photograph, and is, moreover, permanent, and far cheaper.

The range of subjects covered by the process is only limited by the limit of what can be secured in the photographic negative; whatever can be obtained in the negative can be printed at the printing-press, whether it be a portrait from life, a view from nature, an artist's or architect's drawing, a statue, a coin, a botanical specimen, a surgical case,—any subject that can possibly be photographed comes within its reach. The short description that I have often used as my text perhaps describes what I would say in the fewest words: "The pictures produced by the Heliotype process are, in effect, photographs printed in printer's ink at an ordinary printing-press. They are produced with great rapidity, and independently of light; they are as permanent as engravings; they require no mounting, but come from the press with clean margins, finished, and ready for binding or framing."

A NEW DEPARTURE IN ART.

MESSRS. JAMES R. OSGOOD & CO. respectfully invite the attention of art-lovers to their large and varied collection of Heliotype Prints. The Heliotype process has initiated a new departure in Art. It reproduces Engravings with faultless accuracy, and with a delicacy which frequently secures a more pleasing effect than the original engraving itself. These Heliotypes are not cheap or imperfect imitations, but absolutely exact copies; and being printed in ink, they are permanent.

The Heliotype multiplies, for the culture and gratification of all who can fitly appreciate them, the rare works of the old masters; and gives to Rembrandt, Dürer, Correggio, Marc-Antonio, and other renowned artists of past centuries, a contemporary fame and interest, by reviving for this generation the masterpieces which won for them the admiration of former ages, and a name for all time.

The Heliotypes now offered to the Public include not only the best works of the old masters, from the celebrated "Gray Collection" at Harvard University, but a large number of the finest and most artistic of the works of modern artists. Both lists are given herewith, and the titles alone indicate well the variety and comprehensive scope of the Process.

These Heliotypes vary in price from Fifty Cents to One Dollar and Fifty Cents, which is but a fraction of the cost of the Engravings. They can be seen at the store of James R. Osgood & Co., in a large variety of handsome frames. They are sold at the bookstores generally, and are offered at retail by the Publishers,

JAMES R. OSGOOD & CO., Boston.

HELIOTYPE PUBLICATION OF THE GRAY COLLECTION OF ENGRAVINGS,

HARVARD COLLEGE.

By JAMES R. OSGOOD & CO., Publishers, Boston.

MESSRS. JAMES R. OSGOOD & CO. have the pleasure of announcing that by the desire of the President and Fellows of Harvard College they have published Heliotype reproductions of the principal art treasures of the "Gray Collection of Engravings," owned by Harvard College. This Collection is one of the most complete and perfect in the country. It contains the choicest and most costly proofs of many of the best engravers of the world, and is especially rich in the original works of ALBERT DÜRER, REMBRANDT, MARC-ANTONIO, LUKAS VAN LEYDEN, CARACCI, and others. It comprises the best engravings of RAPHAEL MORGHEN, LONGHI, TOSCHI, ANDERLONI, MÜLLER, WILLE, DESNOYERS, MANDEL, STRANGE, SHARPE, WOOLLETT, and other leading engravers, from the pictures of RAPHAEL, TITIAN, CORREGGIO, GUIDO, LEONARDO DA VINCI, MURILLO, and other celebrated artists. The portraits by VELASQUEZ, VAN DYCK, and others, and the engraved heads of distinguished persons by NANTEUIL, EDELINCK, MASSON, and HOUBRAKEN, are a most important feature of the Collection.

The publishers are enabled, by means of the rapidity, faithfulness, and artistic quality of the Heliotype Process, to offer to the public beautiful reproductions from the choicest and most costly works of art at the lowest possible prices. Rare etchings or artist-proof engravings, worth hundreds of dollars each, may be reproduced and sold at prices varying from fifty cents to two or three dollars; thus bringing the treasures of art-galleries within the reach of all, and affording a means of art-education hitherto unattainable.

SPECIAL PORTFOLIOS.

The Frescos of Correggio and Parmegiano, engraved by PAOLO TOSCHI. From the *Gray Collection of Engravings*. 24 plates in Portfolio. Price, \$25.00. Single plates, \$1.50 each.

Parmegiano.

- | | |
|----------------------------------|---|
| I. St. Agatha. | III. Two Deacons: San Lorenzo and San Vincenzo. |
| II. St. Lucia and St. Apollonio. | IV. St. George. |

Correggio.

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| V. Madonna della Scala, — Virgin and Child. | XII. Children, one harnessing a dog. Heads of two children behind. Below, the Fates. |
| VI. Diana in a Chariot, returning from the Chase. | XIII. Children, one blowing a horn. Below, Pan blowing on a conch-shell. |
| VII. Children. Below, Fortuna, with cornucopia, rudder, and globe. | XIV. The Coronation of the Virgin. Nos. XIV., XV., and XV. Group of Cherubs and Angels. } XVI. form but one com- position. |
| VIII. Children, one with stone on head. Below, youth with cornucopia, bringing a libation to the altar. | XV. Group of Cherubs and Angels. |
| IX. Children, one with mask. Below, Nature (or Summer), reclining, holds in one hand a cornucopia, in the other a scorpion; on her head a rampant snake, and before her a basket with herbs and flowers. | XVI. Group of Cherubs and Angels. |
| X. Children, one embracing a dog. Below, Juno suspended from heaven, with an anvil under her feet. | XVII. St. John the Evangelist. |
| XI. Children, one holding a spear. Below, a bearded old man, sitting in a chair like Jove, with a sceptre in his hand. | XVIII. St. John and St. Augustine. |
| | XIX. St. Matthew and St. Jerome. |
| | XX. St. Mark and St. Gregory. |
| | XXI. St. Luke and St. Ambrose. |
| | XXII. Two Apostles, — St. Peter holding the keys. |
| | XXIII. Two Apostles. |
| | XXIV. St. Thomas. |

A Series of Studies after Five Paintings by RAPHAEL in the Madrid Gallery. From the *Tosti Collection of Engravings* in the Boston Public Library. 24 plates in Portfolio. Price, \$25.00. Single plates, \$1.50 each.

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|---|---|
| I. THE VISITATION. | 13. The Young Tobias. |
| 2. Saint Elizabeth. | 14. The Virgin Mary and the Infant Jesus. |
| 3. The Virgin Mary. | 15. Saint Jerome. |
| IV. THE HOLY FAMILY, finished by Giulio Romano. | 16. Study of Hands and Feet. |
| 5. Saint Joseph. | XVII. THE BEARING OF THE CROSS; or, "Lo Spasimo." |
| 6. The Infant Jesus. | 18. Head of Christ. |
| VII. THE HOLY FAMILY, called "The Pearl." | 19. The Virgin Mary. |
| 8. The Virgin Mary, called "The Pearl." | 20. Mary Magdalene. |
| 9. Saint Anne. | 21. Holy Woman. |
| 10. The Infant Jesus. | 22. Saint John. |
| XI. THE MADONNA OF THE FISH; or, The Virgin and Tobias. | 23. Holy Woman, painted after "La Fornarina." |
| 12. The Angel Raphael. | 24. Simon the Cyrenian. |

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CATALOGUE

OF

Heliotype Engravings of Modern Subjects.

PUBLISHED BY JAMES R. OSGOOD & CO.,

CATHEDRAL BUILDING, WINTHROP SQUARE, BOSTON.

Painters.	Title of Subject.	Engravers.
ANKER	Little Architect	A. & E. VARIN.
"	Little Musician	"
ANTIGNA	Storm	"
BERNE-BELLECOUR	The Rent Day	P. GIRARDET.
BERTRAND	Marguerite	C. A. DEBLOIS.
"	Ophelia	"
BEYSCHLAG	Woodland Vows	H. EICHENS.
BONHEUR, ROSA	Morning in the Highlands	C. G. LEWIS.
BOUGUEREAU	The Guardian Angel	BERTINOT.
"	Little Marauders	ANNEDOUCHE.
BROCHART	Cupid Captive	COTTIN.
"	Sweet Waters	"
"	The Bird-Seller	LURAT.
"	The Image-Seller	"
CARTER, JOHN	A Rat-Catcher with his Dogs <small>(taken from the original drawing, which was made by a pen held in the mouth, the Artist having lost both arms).</small>	E. GIRARDET.
CERMAK	An Episode of the Montenegrin War	A. MASSON.
CHAPLIN	Lisette	"
"	The Pet Pigeon	"
CLAUDE, MAXIME	The Hall	LEVASSEUR.
COMPTE-CALIX	A Lesson in Geography	JOUANIN.
"	Poor Love	P. GIRARDET.
COT	Meditation	H. EICHENS.
"	Spring	A. & E. VARIN.
DELAROCHE, PAUL	Moses on the Nile	H. DUPONT.
DIEFFENBACH	The Betrothal	A. & E. VARIN.
DUBUFFE, E.	The Widow's Mite	JOUANIN.
DURAND, S.	Granting the License	P. GIRARDET.
"	The Barber Shop	"
EDDIS, E. U.	Going to Work	G. H. EVERY.
"	Helping Gardener	C. TOMPKINS.
FAED, T.	A wee bit Fractious	W. H. SIMMONS.
"	Sunday Afternoon	F. STACPOOLE.
FRERE, ED.	Don't be Shy	DESMAISONS.
GOODALL, F.	Palm Offering	F. STACPOOLE.
"	The Mother of our Lord, Obedient to the Law	S. COUSINS.
"	The Mother of our Lord, Patient in Tribulation	"
HAMON	Aurora	LEVASSEUR.
"	Cupid's Visit	BAL.
"	The Bird's Meal	LEVASSEUR.
INGRES	La Source	CALAMATTA.
JOURDAN	A Mother's Treasure	ANNEDOUCHE.
KNAUS	Cock of the Walk	"
"	Little Kittens	SONNENLEITER.
"	The Christening	R. GIRARDET.
"	The Marauder	"

Painters.	Title of Subject.	Engravers.
LANDSEER, SIR EDWIN.....	A Distinguished Member of the Humane Society	G. ZOBEL.
"	A Piper and Pair of Nutcrackers	"
"	Brae-Mar	"
"	Browsing	T. LANDSEER.
"	Chevy	"
"	Dignity and Impudence	G. ZOBEL.
"	High Life	C. C. HOLLYER.
"	King of the Forest	T. LANDSEER.
"	Laying down the Law	"
"	Low Life	C. C. HOLLYER.
"	Monarch of the Glen	G. ZOBEL.
"	Princess Beatrice	W. H. SIMMONS.
"	Ptarmigan Hall	T. LANDSEER.
"	Red Deer at Chillingham	G. ZOBEL.
"	Shoeing the Bay Mare	C. G. LEWIS.
"	Suspense	J. C. WEBB.
"	The Challenge	J. W. WATTS.
"	The Connoisseurs	S. COUSINS.
"	The Font	T. LANDSEER.
"	"There's Life in the Old Dog yet"	H. T. RYALL.
"	The Sanctuary	J. W. WATTS.
"	The Shepherd's Chief Mourner	G. ZOBEL.
"	The Sick Monkey	W. H. SIMMONS.
"	The Sleeping Bloodhound	J. C. WEBB.
"	The Stag at Bay	T. LANDSEER.
"	The Twins	G. ZOBEL.
"	Wild Cattle at Chillingham	"
LEJEUNE, H.	Great Expectations	W. H. SIMMONS.
"	Red Ridinghood	H. LEMON.
VAN LERIEUS.....	Lady Godiva	T. L. ATKINSON.
MARAK	Spring	E. WILLMANN.
"	Summer	"
"	Autumn	"
"	Winter	"
MARCHAL	Penelope	BERTINOT.
"	Phryne	HUOT.
MEISSONIER	The Flemish Smoker	RAJON.
"	The Painter	"
"	The Reader	"
MEYER VON BREMEN.....	Morning Prayer	WITTHÖFT.
"	Evening Prayer	"
MICHETTI	Little Neapolitan Marauders	A. & E. VARIN.
MILLAIS, J. E.	My First Sermon	T. O. FARLOW.
MILLAIS, J. E.	"Yes or No?"	S. COUSINS.
RUDAUX	Hunting	C. A. DEBLOIS.
"	Fishing	"
"	A Landscape Study	LEVASSEUR.
"	Study of an Interior	"
REYNOLDS, SIR JOSHUA.....	Miss Penelope Boothby	S. COUSINS.
"	The Age of Innocence	"
"	The Strawberry Girl	"
SCHÖNLEBER	A Canal at Rotterdam	SCHÖNLEBER.
SCHREYER	Abandoned	C. MOTTRAM.
"	A Wallachian Team	W. UNGER.
"	In Danger	C. MOTTRAM.
SPANGENBERG	At Dark	H. SACHS.
VERBOECKHOVEN.....	The Mother	G. ZOBEL.
VAUTIER	Day Dreams	GEYER.
ZÜBER BÜHLER.....	Morning Glories	A. LEDOUX.
"	Maternal Love	"

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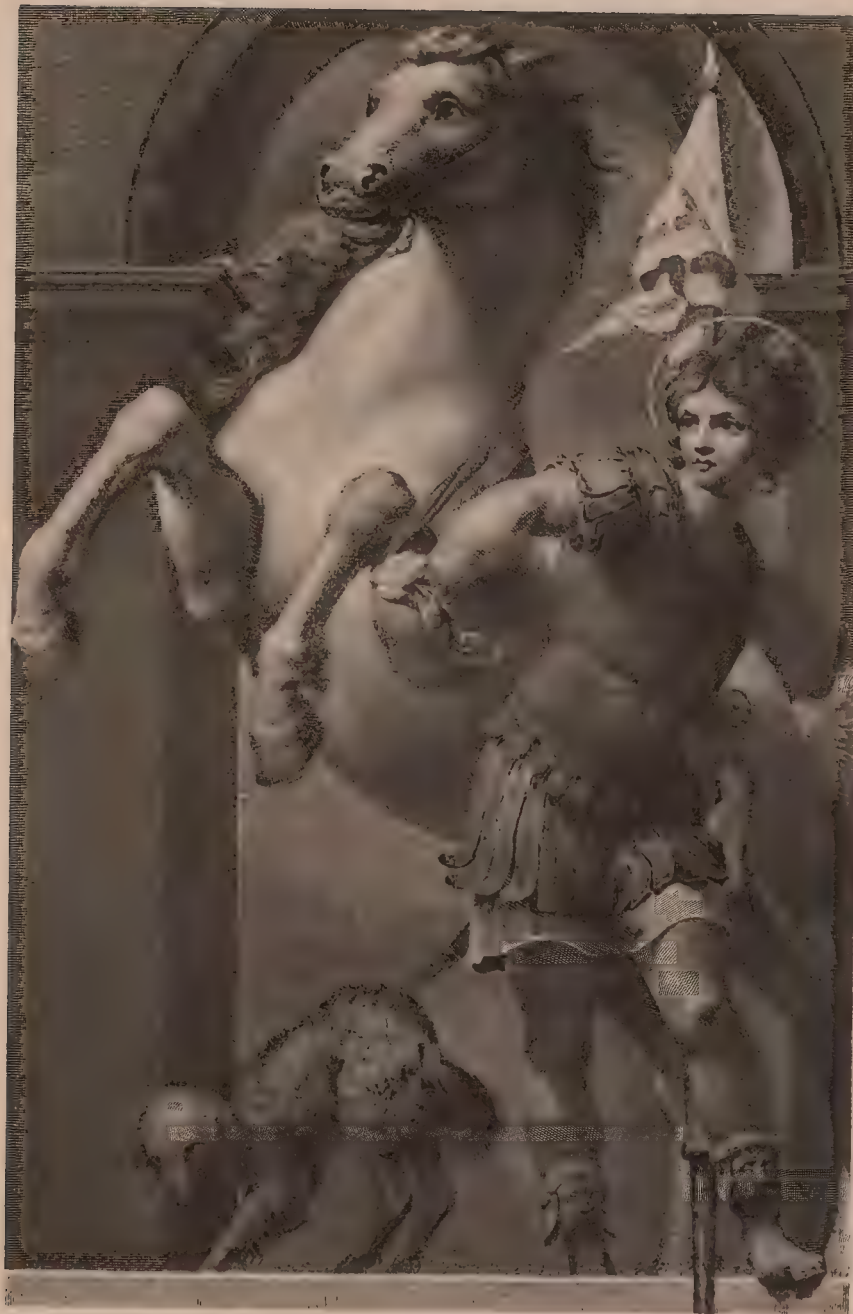
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I. PORTRAIT OF BEETHOVEN. Copied from a steel engraving.

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2. ST. GEORGE. Copied from a steel engraving by Toschi.

Heliotype. James R. Osgood & Co., Boston.



3. DIOGENES. Copied from the Steel Engraving by Sharp.

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4. OAK TREE. Copied from a steel engraving.

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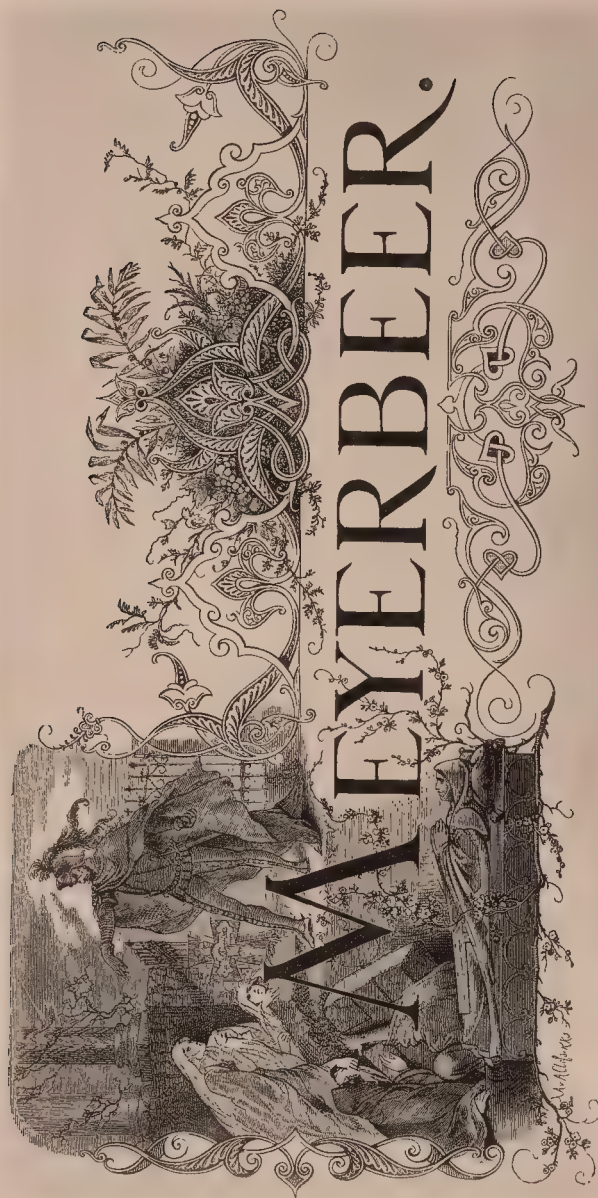
5. SCENE FROM HENRY IV. Copied from a mezzotint engraving.

Heliotype. James R. Osgood & Co., Boston.



6. THE ANGEL RAPHAEL, after Raphael. Copied from a copper engraving.

Heliotype. James R. Osgood & Co., Boston.



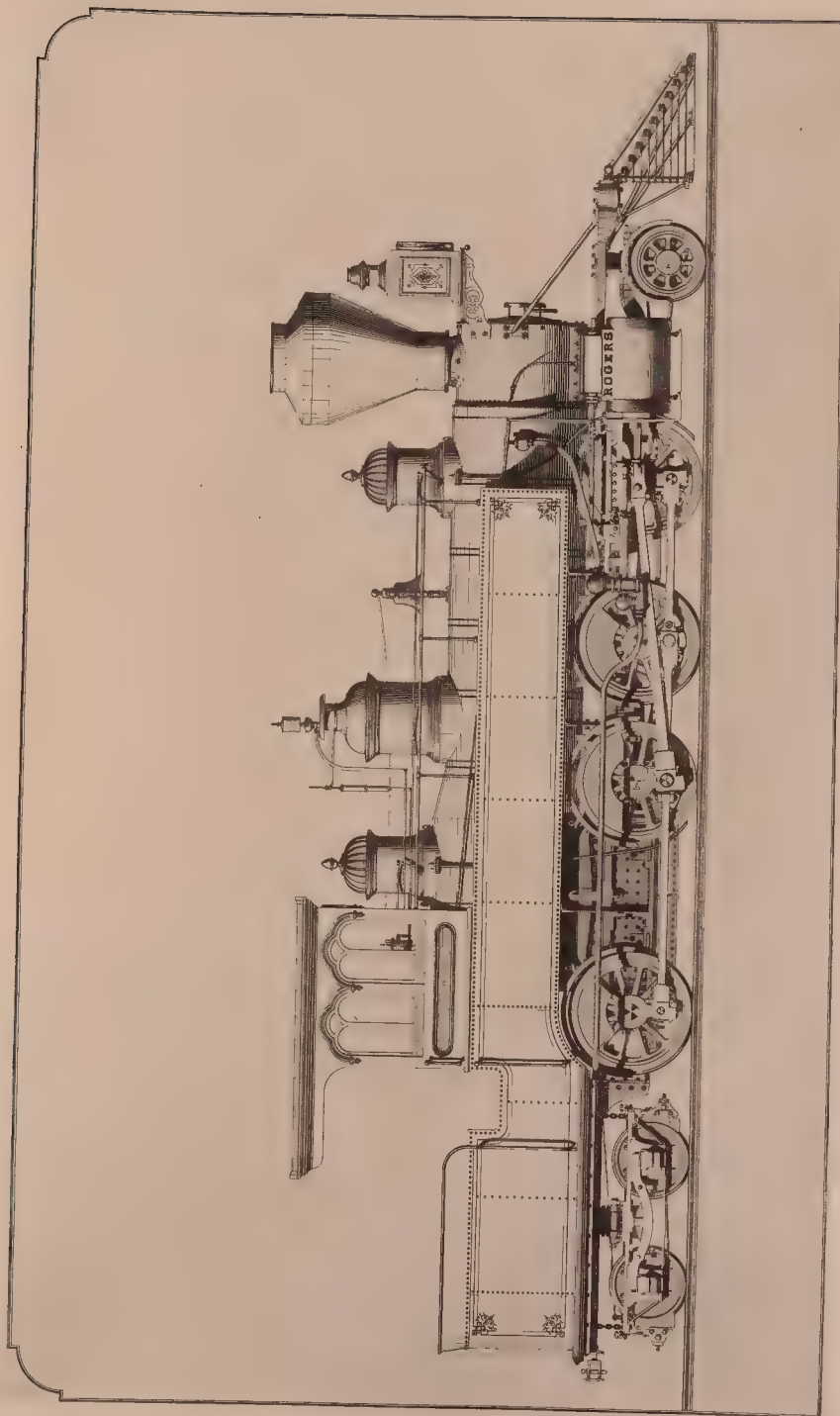
7. Copied from a wood-cut.

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8. SCENE ON THE NILE. From a drawing on glass, by A. Hoppin.

Heliotype. James R. Osgood & Co., Boston.



9. DESIGN FOR A LOCOMOTIVE. Copied from a pen-drawing.

Heliotype. James R. Osgood & Co., Boston.

HARVEY, SUTHER & CO. ARCHT.

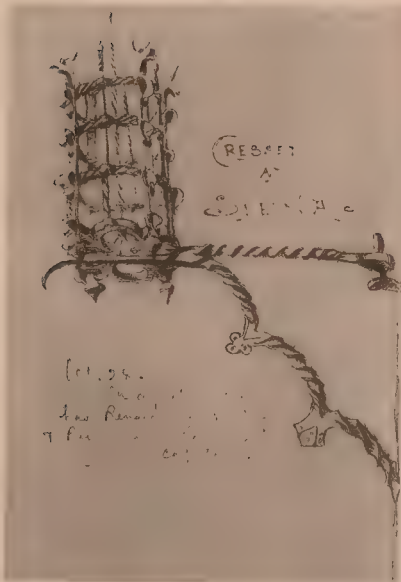
PEMBERTON SQ. BOSTON



DEXTER BUILDING PATRICK & R. I.

10. Copied from an India-ink drawing.

Heliotype, James R. Osgood & Co., Boston.



11. Copied from pencil-sketches.



12. JOHN QUINCY ADAMS. Copied from the painting by Copley.

Heliotype. James R. Osgood & Co., Boston.



13. PORTRAIT FROM LIFE.

Heliotype. James R. Osgood & Co., Boston.



14. NEW PATTERNS OF BOOTS. From the objects.

Heliotype. James R. Osgood & Co., Boston.



15. THE HOLMES HOUSE, AT CAMBRIDGE, MASS. From nature.

Helotype. James R. Osgood & Co., Boston.



16. SUMMER COTTAGE AT NAHANT. From nature.

Heliotype. James R. Osgood & Co., Boston.



17. INTERIOR OF SUMMER COTTAGE AT NAHANT.

Heliotype. James R. Osgood & Co., Boston.

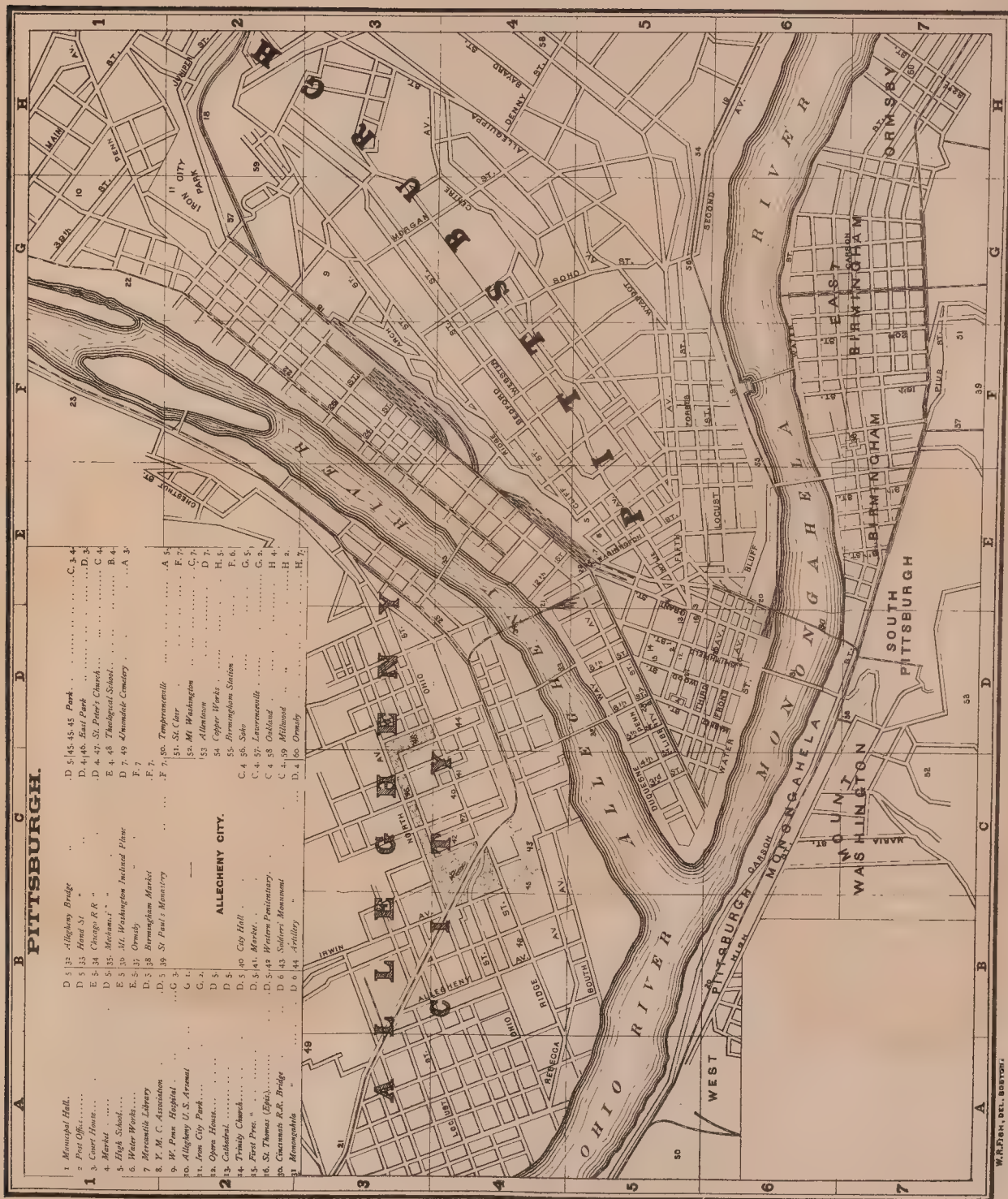


18. THE COURTIN'. Silhouette by Winslow Homer. Printed from stone.

Heliotype. James R. Osgood & Co., Boston.











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22. Printed from an Electrotpe made by the Heliotpe Relief Process. Reduced from a tracing.

Heliotpe. James R. Osgood & Co., Boston.



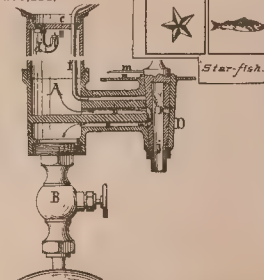


Printed from an Electrotpe made by the Heliotpe Relief Process. Reduced from a wood cut.

24. THE BADGER AT HOME.

Heliotpe. James R. Osgood & Co., Boston.

155,132.



155,132. APPARATUS FOR DRAWING EFFERVESCENT LIQUIDS. Frederick W. Wiesbrock, New York, N. Y. [Filed Apr. 10, 1874.]

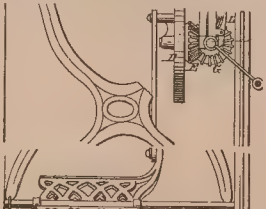
Brief.—By the first turn of the cock the liquid is admitted to the measuring-chamber; by the second turn communication is opened between the measuring-chamber and the expansion-chamber, from which latter the surplus gas escapes; a third turn allows the passage of the liquid to the receiving-vessel. The cock has a fourth opening to form a direct passage from the fountain to the receiving-vessel.

1. The combination of a three-way cock, D F, with a measuring-chamber, A, channels *a b f*, and expansion-chamber G, and a fountain or vessel containing effervescent liquid, substantially in the manner herein shown and described.

2. The additional channel I in the plug of the three-way cock D F, in combination with the measuring-chamber A, channels *a b f*, expansion-chamber G, and with a fountain or vessel containing effervescent liquid, substantially in the manner set forth.

155,133. TREADLES FOR SEWING-MACHINES. Robt. F. Wilcox, Memphis, Tenn. [Filed July 23, 1874.]

Brief.—On the axis of the hand-wheel is secured a bevel-gear wheel, which meshes with a similar wheel on an adjustable shaft at right angles thereto, and is held by means of spring-catch, so it can be moved backward and forward in its bearings by the operator, so as to change the motive power from hand to treadle, and vice versa when desired.



1. The combination, with the hand-wheel D of a sewing-machine, of the bevel-gear wheels E G, adjustable shaft H, and crank J, substantially as and for the purposes herein set forth.

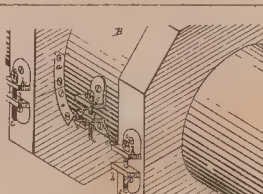
2. The combination of the adjustable shaft H, having circumferential grooves *x x*, and the spring-catch I, as and for the purposes herein set forth.

REISSUES.

6,043. PIPE-JOINTS. Phineas Ball, Worcester, Mass. Patent No. 50,090, dated Sept. 20, 1865. [Filed Aug. 18, 1874.]

Brief.—The guide-clamps keep the ends of the pipes in proper relative position, support the compressing-ring in place, and prevent the lateral displacement of the cement while being compressed. After the cement is set the clamps are removed and used in forming a new joint.

155,131.



1. The combination, with the ends of the pipes B C, of guide-clamps A A, for the purpose set forth.

2. The combination, with the clamps A A, of the flanges *f f* or pins *d d*, substantially as and for the purposes set forth.

3. The combination, with the under side of the clamps A A, of pins *e e*, for sustaining the lower half of the sleeve while being filled, as described.

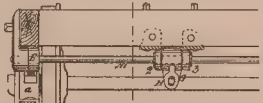
4. The combination, with the overlapping parts P and S, of the ears *g g* and screws *x x*, for the purposes set forth.

5. The combination, with two adjacent flangeless pipes, of a sheet-metal compressing-ring, B, substantially as and for the purpose set forth.

6. The combination of a compressing-ring, B, and a cement or analogous packing, C, with the ends of two adjacent pipes, substantially as and for the purposes set forth.

7. The combination of the compressing-ring B, side walls A A, and packing C with the ends of two adjacent pipes, all operating substantially as and for the purposes set forth.

6,049. CAR-SPRINGS. Albert Bridges, New York, N. Y., assignor to himself and Alfred Bridges. Patent No. 38,050, dated July 29, 1862. [Filed Mar. 4, 1874.]



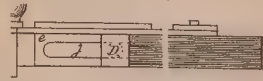
1. A railway-car spring composed of a bar of steel and an arm formed on or connected therewith, whereby the action of the spring is by torsion of the bar, as and for the purpose described.

2. The adjustable torsional apparatus consisting of the connection H, in combination with the brackets 1 2 3 4 and levers E F G, as set forth.

3. The torsional springs M N, in combination with arms G E F, applied to a car-truck so that the equalizing effect shall be obtained, substantially as described.

6,050. TOOLS FOR THE MANUFACTURE OF PAPER BAGS. Edwin J. Howlett, Philadelphia, Pa., assignee of himself and Susan Kirk. Patent No. 63,342, dated Feb. 26, 1867; reissue No. 3,713, dated Nov. 9, 1869; reissue No. 4,020, dated June 14, 1870. [Filed Aug. 7, 1874.]

Brief.—The tool serves as a guide to aid in folding the bottom of the bag.



1. The combination of the board A, blade B, and adjustable strip D, the whole being arranged substantially in the manner described.

2. The combination of the board A, strip *a*, and blade B.

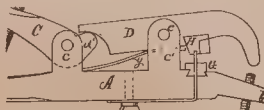
3. The combination of a board, A, with a blade, B, secured substantially as described.

4. The combination of the board A, the guide-plate E, and adjustable strip D.

5. The combination of the board A with the plate E, secured thereto substantially as described.

6,051. SAW-SERES. Oliver Newton, Watertown, N. Y., assignor to Wm. Nash, New Britain, Conn. Patent No. 39,393, dated July 21, 1863. [Filed Aug. 3, 1874.]

Brief.—The tooth of the saw is grasped between the dies H G, and at the same time the projection *a* on the upper lever presses the saw-blade down and gives the proper set.



The rocking-lever D, carrying the die H, in combination with the lever C and the frame A, provided with the die G and handle B, as and for the purpose set forth.

6,052. HEELS FOR BOOTS AND SHOES. M. H. Prescott, Ottawa, Ill. Patent No. 80,192, dated May 13, 1869. [Filed June 23, 1874.]

Brief.—Reissue of Patent No. 90,192, granted May 13, 1869.

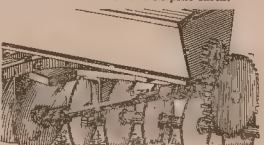


1. The hollow heel *a*, having an inward flange, *d*, in combination with the plate *e*, attached to the boot or shoe at the heel, as and for the purposes specified.

2. A metallic heel made hollow, and having an inward flange around the upper and outer portion, and with the front portion of the heel removed sufficiently to allow the heel to be slipped into place from the rear, in combination with the metallic plate attached to the boot or shoe, substantially as set forth.

6,053. SEEDING-MACHINES. Silas G. Randall, Providence, R. I., assignor to A. A. Randall, same place. Patent No. 137,006, dated Mar. 18, 1873. [Filed May 6, 1874.]

Brief.—The disk-frames recede backward in V shape, the front ends, however, lapping one over the other, and each pivoted to give free motion. The tongue is vertically adjustable. The seeding devices are operated from one of the disk-gangs by means of a universal-joint connection. Forked scrapers are pivoted to the disk-frames, the disks working between the forks to remove surplus earth.



1. The combination, with the main frame, of the independent disk-frames, arranged in different vertical planes relatively to each other, and with their adjacent inner ends overlapping, and lying one behind the other, substantially as hereinbefore set forth.

2. The combination of the main frame, the two disk-frames connected therewith in different vertical planes, with their adjacent ends lying one behind the other, a series of disks arranged in two independent sets, and an axle mounted on each disk-frame, on which axle each disk of the set is loosely mounted, substantially as hereinbefore set forth.

3. The combination, substantially as set forth, of a gang of disks, a disk-frame in which they are mounted, and a main frame, near the outer end of which the outer end of the disk-frame is pivoted, while its inner end is connected with the central portion of the main frame.

4. The combination, substantially as hereinbefore set forth, of the main frame, the adjustable tongue, and the disk-frames, adjustable longitudinally, as well as angularly, relatively to each other at their inner ends.

5. The combination of the seed-controlling apparatus with one of the disk-gangs by means of a universal joint connection, whereby the seeding mechanism is driven by the disk-wheels.

6. The combination of the disk-shaft, disks mounted thereon, thimbles interposed between the disks, and clamp-nuts, these members being constructed and operating, substantially as set forth, to hold the disks securely, and yet admit of their being readily removed and replaced.

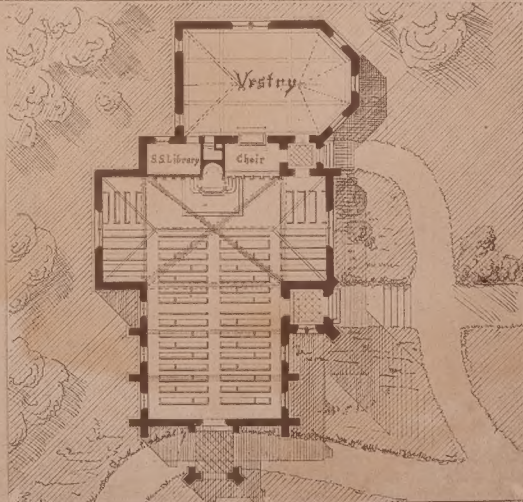
7. The combination of the disks and the forked pivoted scrapers overlapping the disks.





26. Copied from samples of lace.





Proposed Unitarian Church — North Easton — Mass.

27. Copied from a brush-drawing.

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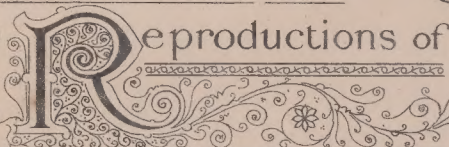
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